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HDP/SB/21 based on PTO/SB/21 (08-00)

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/748,175
Filing Date	December 31, 2003
Inventor(s)	Lukas TROSMAN, et al.
Group Art Unit	3663
Examiner Name	Alexandra F. AWAI
Attorney Docket Number	24GA127098

ENCLOSURES *(check all that apply)*

- ☐ Fee Transmittal Form
- ☐ Fee Attached
- ☐ Amendment
- ☐ After Final
- ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
- ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Assignment Papers *(for an Application)*
- ☐ Letter to the Official Draftsperson and _____ Sheets of Formal Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
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- ☐ CD, Number of CD(s) _____
- ☐ After Allowance Communication to Group
- ☐ LETTER SUBMITTING APPEAL BRIEF AND APPEAL BRIEF (w/clean version of pending claims)
- ☒ Appeal Communication to Group *(Notice of Appeal, Brief, Reply Brief)*
- ☐ Proprietary Information
- ☐ Status Letter
- ☐ Other Enclosure(s) *(please identify below)*:

Remarks

Revised Appeal Brief in Response to Non-Compliant Appeal Brief Communication

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm *or* Individual name	Harness, Dickey & Pierce, P.L.C.	Attorney Name Matthew J. Lattig	Reg. No. 45,274
Signature			
Date	September 29, 2006		

(HDP Ref: 8564-000032/US)

IN THE U.S. PATENT AND TRADEMARK OFFICE

Appellants:	Lukas Trosman, et al.
Application No.:	10/748,175
Art Unit:	3663
Filed:	December 31, 2003
Examiner:	Alexandra F. AWAI
For:	AXIALLY SEGREGATED PART-LENGTH FUEL RODS IN A REACTOR FUEL BUNDLE
Attorney Docket No.:	24GA127098
Conf. No.:	5553

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September 29, 2006

REVISED APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. § 41.37

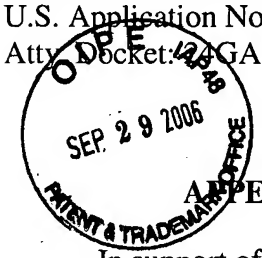
Dear Sir:

In reply to the notification of Non-Compliant Appeal Brief mailed September 1, 2006, Appellants submit herewith their revised Brief on Appeal as required by 37 C.F.R. §41.37.

APPELLANT'S BRIEF ON APPEAL UNDER 37 C.F.R. §41.37
U.S. Application No.: 10/748,175
Atty. Docket: 24GA127098 (HDP Ref: 8564-000032/US)

TABLE OF CONTENTS

Page



APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. § 41.37

In support of the Notice of Appeal filed May 15, 2006, appealing the Examiner's final rejection mailed February 13, 2006 of each of the claims appearing in the attached claims appendix (Appendix IX), Appellants hereby provide the following remarks.

This is a revised Appeal Brief to correct sections V (Summary of claimed Subject Matter), X and XI (add as separate Appendices), per the notification of Non-Compliant Appeal Brief mailed to Appellants representative on September 1, 2006. Each feature in claims 21, 29 and 31 is mapped to FIGS. 2 and/or 5 by element number, and/or footnoted to specific paragraphs and/or lines in the specification where applicable.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Global Nuclear Fuel-Americas, LLC, as reflected in the assignment recorded at reel 014858, frame 0116.

II. RELATED APPEALS AND INTERFERENCES

A related Appeal is pending in Application Ser. No. 10/748,174. The Notice of Appeal was filed May 16, 2006. The related Appeal Brief and arguments may have a bearing on the Board's decision in this Appeal.

III. STATUS OF CLAIMS

Claims 21-26 and 28-32 are pending in the application, with claims 24, 28 and 31 being in independent form. Claims 1-20 and 27 have been previously cancelled. Each of claims 21-26 and 28-32 remain finally rejected and are being appealed.

IV. STATUS OF AMENDMENTS

An amendment after filing a Notice of Appeal under 37 C.F. R. §41.33 was filed August 10, 2006. As of the date of filing of this Appeal Brief, the Examiner had not acted on the amendment. The amendment was made to claims 30-32 to comply with requirements of form expressly set forth by the Examiner in the Final Office Action mailed February 13, 2006.

As Appellants' presume that this amendment will be entered by the Examiner for purposes of Appeal (since the amendment was made to correct matters of form and/or to reduce issues at Appeal), the Claims Appendix reflects claims 21-26 and 28-32 as amended in the August 10, 2006 submittal.

V. SUMMARY OF CLAIMED SUBJECT MATTER

A. Independent Claim 21.

Referring to FIG. 2 below, claim 21 recites a fuel bundle 10 for a boiling water reactor.[1] The fuel bundle includes a generally square, hollow tube 13 having four sides which are configured as sides of the bundle 10.[2] As shown in FIG. 2 below, the bundle 10 includes a pair of water passages 14, 16 located adjacent to a longitudinal centerline 40 of the tube 13 so as to extend centrally through the tube 13, the pair of water passages 14, 16 supported by one or more rod supports 26, 27[3], and a plurality of fuel rods arranged in a 10x10 (FIGS. 2, 3) or 9x9 matrix (FIG. 5) and including full-length rods 18 and part-length rods 20, 22.[4]

The part-length rods further include a first part-length rod group 46 including two short-length fuel rod subsets 47, 48 in a mirror-image along the centerline 40 between the two water passages 14, 16, each subset 47, 48 further comprising three short-length fuel rods 22 in a triangular orientation with one rod 22 of the subset closer to the longitudinal centerline 40

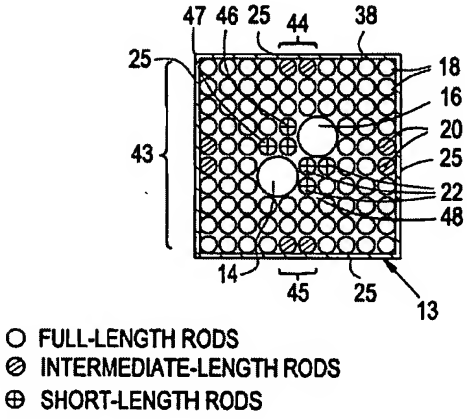
[1] Appellants' specification, para. [0019], line 1 and FIGS. 1, 2.
[2] Appellants' specification, para. [0019], line 3 and FIG. 1.
[3] Appellants' specification, para. [0019], and FIG. 1
[4] Appellants' specification, see also para [0020], lines 1-4 and FIG. 1.

between the two water passages 14, 16 than the other two rods 22, the one rod 22 in direct adjacent relation to the other two rods 22 of the subset 46 or 47.[5]

As shown in FIG. 2 below, the part-length rods further include a second part-length rod group 44 including four pairs of intermediate-length rods 44, 45, each intermediate-length rod pair 44, 45 centrally located in the outermost row or column of the 10x10 or 9x9 matrix adjacent a corresponding one of the four sides of the tube.[6]

In an example, each short-length fuel rod 22 has a nominal length E of approximately 33% of the total length C of any one of the full-length fuel rods 18, and may range in length between approximately 10% to approximately 40% of the length C of any one of the full-length fuel rods 18.[7]

FIG. 2



B. Independent Claim 29

Referring to FIG. 2 above, claim 29 is directed to a fuel bundle 10 for a boiling water reactor, comprising a pair of centrally located water passages 14, 16 arranged on either side of a longitudinal centerline 40 of the bundle 10 within a 10X10 fuel-rod matrix (see FIG. 2) bounded by four sides of a generally square, hollow tube 13, the fuel rods including full-length 18, intermediate length 20 and short-length fuel rods 22.[8]

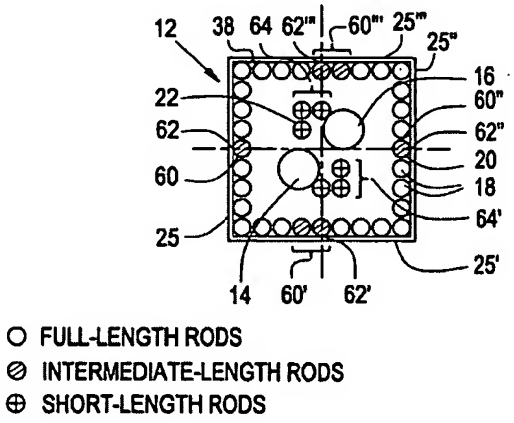
[5] Appellants' specification, para. [0026], lines 1-7.
[6] Appellants' specification, para. [0024], lines 8-12.
[7] Appellants' specification, para. [0026], lines 13-15.
[8] Appellants' specification, paras. [0019, lines 1-3, [0020], lines 2-5, [0021], lines 7-12.

The 10X10 fuel-rod matrix includes six short-rods comprising two three-rod subsets 47, 48 in mirror image relationship with one another along the longitudinal centerline 40 between the two water passages 14, 16. As clearly shown in FIG. 2, the short-length rods 22 in each subset are configured in a triangular orientation and directly adjacent to the pair of water passages 14, 16 such that one rod 22 of the three-rod subset 46, 47 is closer to the centerline 40 than the other two rods 22 and directly adjacent to the other two rods 22.

C. Independent Claim 31

Referring to FIG. 5 below, claim 31 is directed to a fuel bundle 10 for a boiling water reactor, comprising a pair of centrally located water passages 14, 16 arranged on either side of a longitudinal centerline of the bundle 10 within a 9x9 fuel-rod matrix (FIG. 5) bounded by four sides of a generally square, hollow tube (described as a channel 12).[9] The fuel rods include full-length 18, intermediate length 20 and short-length 22 fuel rods.[10]

FIG. 5



As shown above in FIG. 5, the 9X9 fuel-rod matrix includes short-rods 22 arranged in two three-rod subsets 64, 64' in mirror image relationship with one another along the

[9] Appellants' specification, para. [0030], lines 1-6.
[10] Appellants' specification, para. [0030], lines 3-5.

longitudinal centerline between the two water passages 14, 16, with the short-length rods in each subset configured in a triangular orientation and directly adjacent to the pair of water passages 14, 16 such that one rod of the 3-rod subset 64, 64' is closer to the centerline than the other two rods 22 and directly adjacent to the other two rods 22.[11]

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 21-26 and 28-32 are unpatentable under 35 U.S.C. §103(a) over Orii et al. (USP 6,735,267, hereafter "Orii") in view of Ueda et al. (USP 5,068,082, hereafter "Ueda") and Johansson et al. (USP 5,229,068, hereafter Johansson).

VII. ARGUMENT

Claims 21-26 and 28-32 are not rendered obvious under 35 U.S.C. §103(a) as being unpatentable over Orii in view of Ueda and Johansson.

A. 35 U.S.C. §103(a) Rejection of Claims 21, 22, 29 and 31[12]

Appellants respectfully submit that Orii, singly or in combination with Ueda, fail to teach or suggest a fuel bundle for a boiling water reactor, comprising at least:

> a first part-length rod group including two short-length fuel rod subsets in a mirror-image along the centerline between the two water passages, each subset further comprising three short-length fuel rods in a triangular orientation with one rod of the subset closer to the longitudinal centerline between the two water passages than the other two rods, the one rod in direct adjacent relation to the other two rods of the subset, and
>
> a second part-length rod group including four pairs of intermediate-length rods, each intermediate-length rod pair centrally located in the outermost row or column of the 10x10 or

[11] Appellants' specification, para. [0030], lines 13-19. .

[12] Appellants submit that claims 23, 24, 26, 30 and 32 are allowable at least for reasons set forth above regarding their corresponding independent claim; these claims are not argued in this section.. However, Appellants have argued these claims separately to highlight specific features therein not taught by the prior art of record.

> 9x9 matrix adjacent a corresponding one of the four sides of the tube

in combination with the other features of independent claim 21; and/or a fuel bundle for a boiling water reactor comprising at least:

> a pair of centrally located water passages arranged on either side of a longitudinal centerline of the bundle within a 10X10 fuel-rod matrix . . . the fuel rods including full-length, intermediate length and short-length fuel rods,
>
> wherein the 10X10 fuel-rod matrix includes six short-rods comprising two three-rod subsets in mirror image relationship with one another along the longitudinal centerline between the two water passages, the short-length rods in each subset configured in a triangular orientation and directly adjacent to the pair of water passages such that one rod of the three-rod subset it closer to the centerline than the other two rods and directly adjacent to the other two rods;

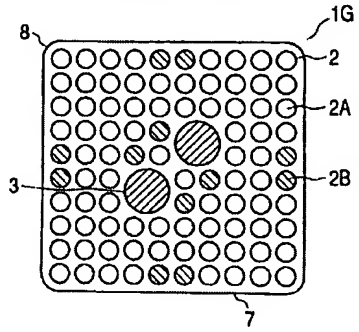
as recited in claim 29; and/or a fuel bundle for a boiling water reactor, comprising:

> a pair of centrally located water passages . . . within a 9x9 fuel-rod matrix . . . , the fuel rods including full-length, intermediate length and short-length fuel rods,
>
> wherein the 9X9 fuel-rod matrix includes short-rods arranged in two three-rod subsets in mirror image relationship with one another along the longitudinal centerline between the two water passages, the short-length rods in each subset configured in a triangular orientation and directly adjacent to the pair of water passages such that one rod of the 3-rod subset is closer to the centerline than the other two rods and directly adjacent to the other two rods,

as recited in claim 31.

The Examiner relies on FIG. 15 of Orii as the primary reference for rejecting each of the independent claims. As shown below, FIG. 15 is a fourth embodiment of Orii and illustrates a pair of short-length fuel rods arranged on each side of the outermost tier of the fuel rod array. There are no intermediate rods in the bundle of FIG. 15. Also in FIG. 15 near a centerline between two water passages 3 are provided two pairs of short-length rods facing each other.

FIG. 15



Further in FIG. 15 of Orii, there is not shown or described the claimed 3-rod subsets in mirror image relationship with each 3-rod subset configured in a triangular orientation and directly adjacent to the pair of water passages since that one rod of the 3-rod subset is closer to the center line than the other two rods and directly adjacent to the other two rods, as recited in each of claims 21, 29 and 31.

Yet, the Examiner has relied on FIG. 19 of Ueda for this alleged teaching. Referring to FIG. 19 below, there is shown four, 4x4 sub-bundles arranged around a cruciform channel 39. Each sub-bundle 38 includes a triangular orientation of part-length rods (P) 22 located near the center of the cruciform (water) channel 39. The four sub-bundles 38 of FIG. 19 approximate an 8x8 fuel assembly and apparently have an effect of increasing the effective multiplication factor at a high temperature operation period and reduce the effect of multiplication factor at a low temperature operation. (*i.e.*, large shutdown margin).[13]

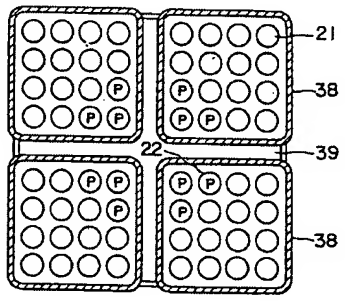


FIG. 19

The Examiner alleges that it would be obvious to combine the four sub-bundle arrangement as shown above in Ueda's 8x8 matrix of FIG. 19 with Orii's 10x10 matrix in FIG.

[13] See Ueda, column 12, lines 53-66.

15. However, Appellants submit that the sub-bundle arrangement in FIG. 19 of Ueda has a completely different fuel rod arrangement, water passage configuration and includes four sets of short-length rods around each adjacent edge of the channel or gap 39. Therefore, Appellants submit that it would not be obvious, and not make sense, to modify Orii's FIG. 15 with the arrangement shown in Ueda's FIG. 19, as the two fuel bundle matrices are completely different structures and have a completely different arrangement of part-length rods around differing water channel configurations which are not compatible with each other.

Thus, from a mechanical standpoint it would not make sense for one skilled in the art to look to the structure of Ueda's FIG. 19 in order to select a different partial-length rod arrangement around a cruciform center channel, to incorporate in the 10x10 fuel rod matrix of Orii's FIG. 15. As it would not be technical feasible to combine these two references, Applicants submit that the rejection is improper.

There are no intermediate fuel rods in FIG. 19 of Ueda. Yet the Examiner relies on a completely distinct and separate embodiment of Ueda, in FIGs. 25A-D, which shows a completely different 9x9 fuel bundle arrangement with center water rod, than that shown in FIG. 19. Not only would it not be technically feasible to combine Ueda's 8x8 matrix in FIG. 19 with Orii's 10x10 matrix, it would further be impractical to modify either Ueda's 8x8 matrix in FIG. 19 or Orii's 10x10 matrix with Ueda's 9x9 matrix shown in FIGs. 25A-25D, as this twenty-third embodiment of Ueda has a completely different water channel and bundle configuration than shown in either Ueda, FIG. 19 or Orii, FIG. 15.

Moreover, it does not appear the Examiner has made out a *prima facie* case of obviousness, and/or has utilized hindsight reasoning and hence has not provided the requisite motivation to combine Ueda with Orii, as to be set forth more fully below.

1. Rejection fails test for establishing prima facie case of obviousness.

Appellants direct the Examiner's attention to two cases decided by the Court of Appeals for the Federal Circuit (CAFC), In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed.Cir. 1999) and In re Kotzab, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed.Cir. 2000). Both of these cases set forth very rigorous requirements for establishing a prima facie case of obviousness under 35 U.S.C. §103(a). To establish obviousness based on a combination of

elements disclosed in the prior art, there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant. The motivation, suggestion or teaching may come explicitly from one of the following:

(a) the statements in the prior art (patents themselves)

(b) the knowledge of one of ordinary skill art, or in some cases,

(c) the nature of the problem to be solved.

See Dembiczak 50 USPQ at 1614 (Fed.Cir. 1999). In Kotzab, the CAFC held that even though various elements of the claimed invention were present (in two separate embodiments of the same prior art reference), there was no motivation to combine the elements from the separate embodiments, based on the teachings in the prior art.

As previously discussed, and the Examiner refers to a completely separate embodiment of Ueda (FIG. 25A and 25B), but provides no motivation for combining this embodiment with Ueda FIG. 19 and Orii FIG. 15. The 9x9 fuel bundle design of Ueda FIGS. 25A-B is completely different (see size and water passage location) from the 8x8 matrix of sub-bundles in Ueda FIG. 19.

In order to establish a prima facie case of obviousness under 35 U.S.C. §103(a), the Examiner must provide particular findings as to why the two pieces of prior art are combinable. See Dembiczak 50 USPQ2d at 1617. Broad conclusory statements standing alone are not "evidence".

In order to provide motivation for combining Ueda with Orii on page 5 of the Office Action of February 13, 2006, the Examiner asserts:

> It would have been obvious to one skilled in the art at the time of the invention to combine the aforementioned teachings in order to provide the benefits that are the disclosed objects of all the referenced prior art, particularly an improved shutdown margin.

Appellants have read the entirety of Orii and Ueda and do not see how reading these references one of ordinary skill in art would think to combine Ueda's FIG. 19 with Orii's FIG. 15. As already indicated, Orii is directed to a completely different fuel assembly configuration, a 10x10 matrix with two central circular water passages there through. On the other hand, Ueda is directed to an 8x8 matrix comprised of four sub-bundles 38 around a single cruciform water

channel 39. Neither Ueda nor Orii teach or suggest the significance of using part-length rods in the vicinity of the water passages, or in the outermost ring of the bundle.

Additionally, the primary focus of Orii is to increase burn-up without increasing pressure loss as compared to conventional fuel assemblies. The primary focus of Ueda is to ensure the maintenance of reactor shutdown margin and to improve the axial power distribution. One skilled in the art could not discern, without substantial undue experimentation, if adding an additional part-length rod as shown in FIG. 19 of Ueda in place of a full-length rod in FIG. 15 of Orii, would in fact improve shutdown margin, improve the effect of a void coefficient, or further increase burn-up without increasing the pressure loss.

Further, since there are two distinctly different fuel bundle structures and water channel configurations in the two references, modification of one reference with the other would essentially destroy the combination. This is because the Examiner has merely selected Orii as a blueprint based on Applicants' FIG. 2 and looked for specific 3-rod subsets in any type of fuel bundle orientation to insert in place of Orii's two pairs of part-length rods in facing relationship at the water passages.

Accordingly, the alleged motivation provided by the Examiner does not come from a statement in the prior art (patents themselves-none given), or based on knowledge of one of ordinary skill art (none given), or in some cases, based on the nature of the problem to be solved. There is no stated problem to be solved in Orii's FIG. 15 that would be rectified by Ueda's fuel assembly structure in FIG. 19.

Accordingly, Appellants respectfully submit that independent claims 21, 29 and 31 (and claim 22 dependent thereon) are allowable at least because the Examiner has failed to establish a proper prima facie case of obviousness under 35 U.S.C. 103(a), in view of Dembiczak and Kotzab.

2. Examiner using Impermissible Hindsight.

The Examiner is using impermissible hindsight reconstruction to reject the claims. The Examiner has used FIG. 2 of the present application as a blueprint, selected a prior art fuel assembly (Orii, FIG. 15) as the main structural device, and then searched other prior art for the

missing elements without identifying or discussing **any specific evidence of motivation to combine,** other than providing conclusory statements regarding the knowledge in the art, motivation and obviousness.

For example, the Examiner alleges that the inclusion of a third rod is no more than a duplication of parts. This makes no sense with regard to the present claimed subject matter, since the additional part length rod at the water channel will change the characteristics of SDM. The Examiner has simply looked for any fuel bundle arrangement which has a triangular orientation of part-length rods somewhere in the vicinity of a water channel to insert into the Orii embodiment of FIG. 15. This Examiner is simply picking and choosing certain features from references without supplying the requisite motivation to combine.

The Federal Circuit has noted that the PTO and the courts "cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention," In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1780, 1783 (Fed. Cir. 1988), and that the best defense against hindsight-based obviousness analysis is the rigorous application of the requirement for a showing of a teaching or motivation to combine the prior art references. Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability--the essence of hindsight. Dembiczak, 50 USPQ2d at 1617. Appellants respectfully submit that claims 21, 29 and 31 (and claim 22 dependent thereon) are allowable for at least this additional reason.

3. Examiner has not provided requisite motivation to combine references.

The Examiner must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious."); In re Fritch, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992) (the examiner can satisfy the burden of showing obviousness of the combination "only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references").

Accordingly, the Examiner has not adequately supported the selection and combination of Orii and Ueda to render obvious that which Appellants have recited in claims 21, 29 and 31.

The Examiner's conclusory statement as to motivation "particularly an improved shutdown margin", without any evidentiary support that the proposed combination would in fact improve SDM, does not adequately address the issue of motivation to combine a part-length rod arrangement shown in two, 4x4 sub-bundles of an 8x8 matrix having a cruciform-shaped moderator channel (Ueda, FIG. 19), with a single 10x10 fuel assembly having two central circular water channels (Orii, FIG. 15). Thus, such an assertion of apparent improved shutdown margin is not rooted in fact, but is merely an unsupported generalization that the use of part length rods will create a larger shutdown margin.

Appellants submit that the Examiner's analysis is mere hand-waving, essentially alleging with an overbroad and inconclusive statement that "it is well known" that fuel assemblies with part length rods may help to moderate shutdown margin therein. The Examiner's logic follows that the combination of any fuel assembly design having mirror image 3-rod subsets, regardless of the water channel or fuel assembly configuration of the reference, and regardless of the length and placement of intermediate length fuel rods, when combined with Orii, would hence be "no more than the duplication of parts with predictable (i.e., not unexpected), and intended effects.[14] This logic, without factual evidentiary support, is improper.

The Examiner has found no teaching of a 10x10 matrix fuel assembly with the specifically recited 3-rod part-length rod arrangement in mirror-image relationship around a pair of circular-shaped water passages located adjacent to a longitudinal centerline of the tube so as to extend centrally through the tube. The Examiner has resorted to Ueda's 4x4 sub-bundles of an 8x8 matrix with some semblance of the 3-rod part length arrangement near a cruciform water channel as a substitute to Orii. The apparent benefit or motivation cited by the Examiner on page 5 of the Office Action, "improved shutdown margin" is merely a generic statement that is unsupported in Orii or Ueda, and is simply a reconstitution of what is recited in the present application as a possible benefit to the arrangement in FIGS. 2 and 5. In other words, this statement provides no basis for motivation.

For example, the Examiner reliance on col. 12, lines 61-65 of Ueda as to a large shutdown margin is limited to the specific embodiment of FIG. 19 in Ueda, and fails to suggest

[14] Final Office Action dated February 13, 2006, pg. 5.

any indication for using the specified arrangement of part length rods in a fuel assembly other than in the embodiment of Ueda's FIG. 19.

It is unclear what the Examiner's reliance on Johannson is for motivation to combine Ueda with Orii, other than to show that the use of part length rods lowers pressure drop and hence may improve critical power. This would not necessarily provide motivation to combine, as both Orii and Ueda employ part length rods already. Johansson is not relevant to any motivation for combining the part-length rod arrangement in two of Ueda's 4X4 sub-fuel assemblies in FIG. 19, with Orii's 10x10 fuel assembly having two central circular water channels. This is because critical power is related to boiling transition during actual critical reactor operation, and not to shutdown margin; thus it unclear how Johannson is factually relevant to the Examiner's alleged motivation to combine Ueda with Orii on page 5 of the office action.

This factual question of motivation is material to patentability, and could not be resolved on subjective belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to "[use] that which the inventor taught against its teacher." W.L. Gore v. Garlock, Inc., 721 F.2d 1540, 1553, 220 USPQ 303, 312-13 (Fed. Cir. 1983). The Examiner must explain the reasoning behind his findings of motivation. Simply stating that the motivation for combining Orii and Ueda is "in order to provide the benefits that are the disclosed objects of all the referenced prior art, particularly an improved shutdown margin" is an insufficient explanation for the alleged combination. For at least these additional reasons, Appellants respectfully submit that claims 21, 22, 29 and 31 are allowable.

B. 35 U.S.C. §103(a) Rejection of Claims 23, 24, 26, 30 and 32

Initially, Appellants submit that each of claims 23, 24, 26, 30 and 32 are allowable at least because these claims depend from an allowable independent claim. Additionally, each of these claims contain features which are not taught by the art of record.

The Examiner has not explicitly described where in Orii, Ueda and/or Johansson the following features are taught:

Claim 23: if the length of a given full-length fuel rod is C, the length of a given intermediate-length fuel rod is about 0.66C;

Claim 24: if the length of a given full-length fuel rod is C, the length of a given short-length fuel rod is in a range of about 0.1C to 0.4C;

Claim 26: if the length of a given full-length fuel rod is C, the length of a given short-length fuel rod is about 0.33C;

Claim 30: the 10x10 fuel-rod matrix includes eight intermediate-length rods arranged in four pairs, each intermediate-length rod pair centrally located on an outermost row or column of the matrix nearest a corresponding one of the tube sides; and/or

Claim 32: the 9x9 fuel-rod matrix includes six intermediate-length rods arranged as two intermediate-length rod pairs and two non-paired intermediate-length fuel rods, each of the two pairs and two non-paired rods located in a corresponding outermost row or column of the matrix adjacent a corresponding side of the tube.

FIG. 25A of Ueda describes a particular fuel bundle having one water channel, which has short rod P1 having an axial length of 0.75H that of the normal sized (full-length) fuel rod, and shorter rods P2 having an axial length of 0.5H. This is the extent of partial length rod axial heights described in Ueda. As to claims 30 and 32, no embodiment in any of the prior art cited by the Examiner has the particular orientation and location placement of short and intermediate-length fuel rods. This is because such an arrangement was determined through extensive study and man-years of experimentation and testing. Through these efforts, Appellants have determined a specific orientation and location placement of short and intermediate fuel rods for both a 10x10 and 9x9 bundle, which has not been found by the Examiner in the prior art.

As to each of these dependent claims, the Examiner only makes an unsupported, broad conclusory statement that the number and degree (length) of short and intermediate length rods is "a matter of optimization within prior art conditions or through routine experimentation". This is untrue and incorrect, as Appellants submit that in designing a fuel bundle within the nuclear industry, the length/types, number and location of partial length rods within a given fuel bundle (intermediate and short length fuel rods) can take up to several man-years of effort until a design

is achieved; it is not routine experimentation or simply a matter of optimization within prior art conditions.[15]

Further, this argument is misplaced as the case law is generally applicable to certain temperature or concentration ranges. These claims are directed to specific rod number and location arrangements (claims 30 and 32), and to specific dimensions (claims 23 and 26) of the short and intermediate rod axial heights. Moreover, the claimed range in claim 24 of 0.1 to 0.4C does not fall within Ueda's teaching, since rod P2 in FIG. 25A of Ueda has a height that is half the height of the full length fuel rod.

Since the Examiner has not found that the general conditions of these claims are disclosed in the prior art, the Examiner's reliance on case law behind routine experimentation/optimization to reject these claims is mere hand waving and hence improper. Appellants therefore submit that each of claims 23, 24, 26, 30 and 32 are separately allowable at least for the fact that the Examiner has provided no references which teach or suggest the features therein.

VIII. CONCLUSION

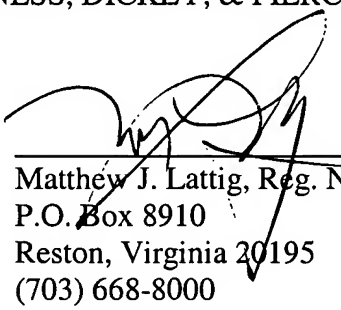
Appellants respectfully request the Board to reverse the Examiner's rejection of claims 21-26 and 28-32 and allow each of these claims.

[15] On the other hand, determining pin enrichments in each fuel rod could be understood as something subject to "routine experimentation".

Appellants have previously paid the Appeal Brief fee and extension of time fees in the present application. Thus, no fee is believed due. The Commissioner is authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By: 

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IX. CLAIMS APPENDIX

21. A fuel bundle for a boiling water reactor, comprising:

a generally square, hollow tube having four sides which are configured as sides of the bundle,

a pair of water passages located adjacent to a longitudinal centerline of the tube so as to extend centrally through the tube, the pair of water passages supported by one or more rod supports,

a plurality of fuel rods arranged in a 10x10 or 9x9 matrix and including full-length rods and part-length rods, the part-length rods further comprising:

a first part-length rod group including two short-length fuel rod subsets in a mirror-image along the centerline between the two water passages, each subset further comprising three short-length fuel rods in a triangular orientation with one rod of the subset closer to the longitudinal centerline between the two water passages than the other two rods, the one rod in direct adjacent relation to the other two rods of the subset, and

a second part-length rod group including four pairs of intermediate-length rods, each intermediate-length rod pair centrally located in the outermost row or column of the 10x10 or 9x9 matrix adjacent a corresponding one of the four sides of the tube.

22. The fuel bundle of claim 21, wherein if the length of a given full-length fuel rod is C, the length of a given intermediate-length fuel rod is in a range of about 0.6C to 0.9C.

23. The fuel bundle of claim 21, wherein if the length of a given full-length fuel rod is C, the length of a given intermediate-length fuel rod is about 0.66C.

24. The fuel bundle of claim 21, wherein if the length of a given full-length fuel rod is C, the length of a given short-length fuel rod is in a range of about 0.1C to 0.4C.

26. The fuel bundle of claim 21, wherein if the length of a given full-length fuel rod is C, the length of a given short-length fuel rod is about 0.33C.

28. The fuel bundle of claim 21, wherein a plurality of voids are formed above upper ends of each of the short and intermediate-length rods to the top of the fuel bundle, the voids configured to trap neutrons for improving a shutdown margin for the boiling water reactor.

29. A fuel bundle for a boiling water reactor, comprising:

a pair of centrally located water passages arranged on either side of a longitudinal centerline of the bundle within a 10X10 fuel-rod matrix bounded by four sides of a generally square, hollow tube, the fuel rods including full-length, intermediate length and short-length fuel rods,

wherein the 10X10 fuel-rod matrix includes six short-rods comprising two three-rod subsets in mirror image relationship with one another along the longitudinal centerline between the two water passages, the short-length rods in each subset configured in a triangular orientation and directly adjacent to the pair of water passages such that one rod of the three-rod subset it closer to the centerline than the other two rods and directly adjacent to the other two rods.

30. The fuel bundle for a boiling water reactor of claim 29, wherein the 10X10 fuel-rod matrix includes eight intermediate-length rods arranged in four pairs, each intermediate-length rod pair centrally located on an outermost row or column of the matrix nearest a corresponding one of the tube sides.

31. A fuel bundle for a boiling water reactor, comprising:

a pair of centrally located water passages arranged on either side of a longitudinal centerline of the bundle within a 9x9 fuel-rod matrix bounded by four sides of a generally square, hollow tube, the fuel rods including full-length, intermediate length and short-length fuel rods,

wherein the 9X9 fuel-rod matrix includes short-rods arranged in two three-rod subsets in mirror image relationship with one another along the longitudinal centerline between the two water passages, the short-length rods in each subset configured in a triangular orientation and

directly adjacent to the pair of water passages such that one rod of the 3-rod subset is closer to the centerline than the other two rods and directly adjacent to the other two rods.

32. The fuel bundle for a boiling water reactor of claim 31, wherein the 9x9 fuel-rod matrix includes six intermediate-length rods arranged as two intermediate-length rod pairs and two non-paired intermediate-length fuel rods, each of the two pairs and two non-paired rods located in a corresponding outermost row or column of the matrix adjacent a corresponding side of the tube.

X. EVIDENCE APPENDIX

As no evidence was submitted and relied upon in this Appeal, this Appendix contains no evidence pursuant to 37 C.F.R. §41.37(c)(1)(ix).

XI. RELATED PROCEEDINGS APPENDIX

As there are no related proceedings, copies of a decision rendered by a court or the Board for such proceedings do not exist and have not been supplied in an Appendix pursuant to 41.37(c)(1)(x).